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Validity Evidence for STEM Interest Identification

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In 2014, ACT developed a method to identify high school students who had an interest in STEM-related fields. By using ACT data elements, this method provided two different types of STEM interest: Expressed and measured. Based on these STEM interest types, students can be assigned to one of four STEM interest groups: Expressed and measured, expressed-only, measured-only, or an interest in non-STEM majors. This brief summarizes the results of a study that assessed the validity of this approach.

STEM types are assigned on the basis of self-reported information and ACT Interest Inventory results obtained when students register for the ACT. Students with an expressed interest indicated an intent to pursue a STEM-related college major and/or occupation. Students with a measured interest had a highest ACT Interest Inventory scale score in Science, or had a highest scale score in Technology *and* a second-highest in Science.

A data set of 163,342 ACT-tested students who first enrolled in college between Fall 2005 and Fall 2009 at one of nearly 50 four-year postsecondary institutions¹ was used to determine if students who were identified as having an interest in STEM actualized this interest in college. The data set included up to six years of post-high school college outcomes for each student. The longitudinal data made it possible to determine students' college major status within three time periods. Specifically, did students have a STEM college major:

1. during their first term,
2. at some point in their college experience, or
3. at the time of college graduation (within six years).

The data set was not a nationally representative sample of ACT-tested students. However, as can be seen in Table 1, the distribution of STEM interest type for the study sample is very similar to that of the ACT-tested graduating class of 2015.

¹ A more detailed description of the data set can be found in Radunzel, J., Mattern, K., & Westrick, P. (2017). *Who will declare a STEM major? The role of achievement and interests*. Iowa City, IA: ACT.

Table 1. Percentage of STEM-Interest Type Among STEM Interested Students

| Student Group | Expressed and Measured | | |
|-----------------------|------------------------|---------------|----|
| | Expressed Only | Measured Only | |
| Tracked Cohort | 33 | 47 | 20 |
| 2015 Graduating Class | 34 | 48 | 18 |

Overall Findings

Classification of the students' college major as STEM or non-STEM revealed a moderately strong association with ACT STEM interest type as revealed by the difference in the percentage of declared STEM majors for students with STEM interest and students without. For the three college time periods studied, these percentages are:

- 46% of students with STEM interest declared a first-term STEM major, compared to 9% of those with interest in other majors.
- 59% of students with STEM interest declared a STEM major sometime during their college careers, compared to 16% of those with interest in other majors.
- 48% of students with STEM interest graduated with a STEM major, compared to 9% of those with interest in other majors.

Providing a more nuanced look, Figure 1 illustrates that students who fell into the expressed and measured STEM interest group were the most likely to pursue a STEM major, regardless of where they were in their college experience. Among the groups with a STEM interest, students with measured-only interest showed the lowest percentages of STEM college majors. These students had ACT Interest Inventory results that pointed to a STEM field, yet did not express this interest by listing a planned STEM major. With extra guidance or counseling to facilitate a greater awareness of STEM-related fields and career opportunities, higher rates of STEM major declaration (and potentially, completion) could occur for measured-only students.

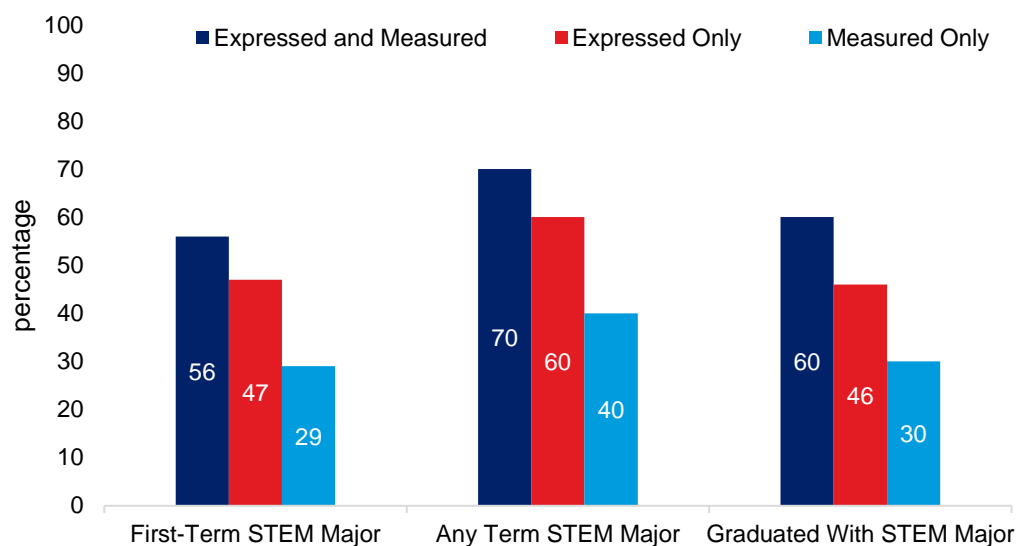


Figure 1. Percentage of students with STEM college majors by STEM interest group and time period

Future Research

Differences between STEM-interested students who declared a STEM major in college and STEM-interested students who did not declare a STEM major offer two topics for further research:

1. STEM-interested students with STEM college majors had higher ACT subject area and STEM scores than STEM-interested students with non-STEM majors even when the cohort was restricted to students who reached college graduation.
2. STEM-interested females declared non-STEM majors at a higher rate than male counterparts.

Discovering the reasons for these differences could be beneficial in helping STEM students plan high school coursework and in career guidance/counseling contexts.

Summary

In the end, ACT's method for identifying STEM-interested students goes a long way toward distinguishing which students are likely to pursue STEM-related majors in college. The different STEM types allow for multiple ways of facilitating student goal attainment. Further investigation of factors impacting classification accuracy and associated academic achievement will enhance the usefulness of this indicator.